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RESTORATION OF SEYMOURIA BAYLORENSIS BROILI, AN AMERICAN COTYLOSAUR

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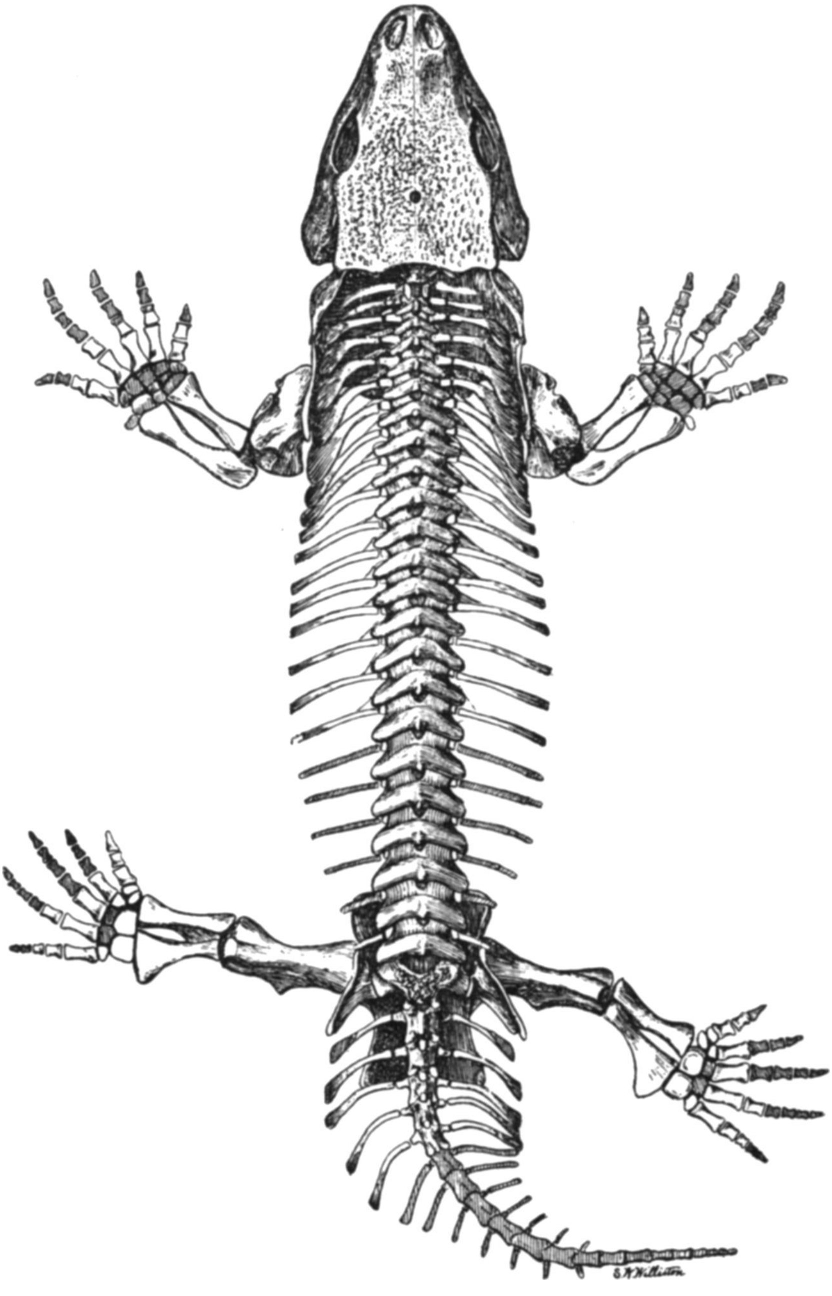
Few Permian vertebrates are of greater interest than the one herewith figured, as restored from a remarkably complete specimen discovered the past year by Mr. Paul C. Miller in the vicinity of Seymour, Baylor County, Texas. The genus and species were originally described by Dr. Broili in 1904 from two imperfect skulls, the clavicular girdle, and a few of the anterior vertebrae and ribs, found on West Coffee Creek, Texas, and preserved in the museum at Munich. Nothing whatever has since been added to our knowledge of the genus, and the appendicular skeleton has remained quite unknown. Of the numerous genera of amphibia and reptilia from the Texas beds not a few are yet but imperfectly known, making it almost impossible to determine many of the isolated limb bones and girdle bones so often found in those regions. The past year I described various limb bones and vertebrae of a small reptile discovered on West Coffee Creek under the name *Desmospondylus anomalus*, suggesting its possible identity with either *Seymouria* or *Pantylus*, especially *Pantylus*, which also is known only from skulls, one of which is in the University of Chicago collections. The two specimens upon which this genus was based are of almost identical size, indicating that the specimens were of adult animals. They prove, however, by comparison with the later acquired specimen, to be congeneric, and of very immature individuals, so immature that they present a number of embryonic characters not seen in the adult specimens, for by the aid of the articulated specimen others of *Seymouria* previously indeterminable have been recognized among the material of the University collections, all from the same region and horizon, the upper or Clear Fork division. And these additional specimens have aided materially in the production of the restoration because of their


S.W.Williston

free condition. The specimen found by Mr. Miller was almost completely inclosed in four pieces of a large clay nodule. All that was visible in the specimen as it lay upon the hillside was a small surface of the cranial table, where a chip had been broken off.

The skeleton, as preserved in the nodule, is almost perfect, save for the large part of the tail, which was inclosed in a protuberance from the main block, and the piece inclosing it doubtless is still to be found in the wash where the scattered pieces were secured. Nearly every bone is in natural articulation, the phalanges for the most part being scattered, some lost, others doubtless yet hidden in the matrix. Furthermore, the bones had suffered almost no distortion or compression. The skeleton was fossilized in a prone position and was somewhat depressed from its own weight. The bones, however, inclosed in the hard, dark, red clay, are rather soft, with a thin, white, cuticular, calcareous layer. So far as possible the skeleton has been laid bare, but no attempt has been made to separate any of the bones, nor could they be separated with safety. The occipital region of the skull, lying above the clavicular girdle, is inaccessible, as are also the posterior ribs, inclosed between the close-lying porrected femora and the vertebral column. Both hind legs are directed forward nearly parallel to the vertebral axis, the feet pulled slightly away from the tibiae and fibulae. The right fore leg also lies close by the side of the body, the hand bones intermingled with the corresponding foot bones. The left fore leg is directed forward. The pectoral girdle lies closely in position, the left side pressed back a trifle, and the pelvic girdle is almost perfectly in place. The skeleton, to the sixth caudal vertebra, measures twenty-one inches. Because of this natural position of the skeleton it has been a matter of little difficulty to figure it in a restored position, the limb bones of other specimens furnishing the proper views in the changed positions. A full description of the form, with detailed figures, will be published later. The figure here given, made with care by myself, will furnish the most of the chief characters of the genus. Those parts unknown or imperfectly known are represented by uniform shading. That the numbers of the phalanges as figured are correct is practically certain because of the like numbers determined by me in *Limnoscelis;* that the toes were slender is evident from several isolated, unplaceable distal phalanges in the matrix. That the tail could hardly have been longer than is represented, perhaps not as long, is indicated by the taper of the six proximal vertebrae preserved in position, folded down, like a dog's tail, to the extremity of the ischia. Two distal tarsals cannot be seen as covered by the metatarsals; and the carpals cannot be clearly made out.

As a whole *Seymouria* stands lowest in rank among known reptiles, approaching in many ways the contemporary amphibians. This is indicated by the structure of the posterior cranial region, by the extraordinary amphibian ear-notch, by the primitive structure of the vertebral centra, as shown in *Desmospondylus*, by the long, free, caudal ribs, by the possession of a single sacral vertebra, and by the very amphibian-like limb bones and girdles. Indeed, so far as the characters are shown in the figure, there is not a single thing to differentiate the form from an amphibian, unless it be the apparent absence of the cleithrum. Unfortunately the mutilation of the bone in the cranial table prevents the corroboration of the temporal sutures as determined by Broili; but I doubt not that Broili's determinations are correct, showing all the bones found in the temnospondylous amphibians and in similar arrangement, some of which have never been detected in other reptiles. The palate, also, as I make it out, is different from that of other known reptiles, though distinctly reptilian in structure. The pectoral and pelvic girdles are absolutely indistinguishable from those of the contemporary amphibians, save by the more posteriorly directed ilia and the absence of the cleithra, and both of these characters may and probably will yet be found in the temnospondyls.

The suture between the scapula and coracoid is very distinct, quite in the position I have found it in other Texas reptiles and amphibians; and the coracoid is composed evidently of but a single element, the posterior element, the so-called coracoid, remaining cartilaginous through life, as was also the case in *Varanosaurus*. It is because of these facts, observed in several forms, that I am quite convinced the coracoid as preserved corresponds identically with the coracoid of the lacertilia and rhynchocephalia, that is, it is the true coracoid, and not the procoracoid. To assume that the coracoid of these animals has been replaced *in toto* by another bone, leaving only the supracoracoid foramen, which alone has remained permanent, the bone surrounding it disappearing to give place to another represented by cartilage, in some of the forms at least, and far back of the foramen, is beyond the limits of my credulity, whatever it may be for others.

In the structure of the skeleton of *Seymouria* nothing is more conspicuous than the extraordinary development of the arches of the dorsal vertebrae, forming almost a carapacial protection for the body. That the animal was crawling in habit there would seem to be no doubt, notwithstanding the position in which the hind legs were found—a position quite the same as that of the type specimen of *Limnoscelis*. No indications of ventral ribs are preserved and I think it may be said with absolute certainty that the creature possessed none in life. On the other hand, scattered through the matrix were numerous small flakes of bone, always isolated. They may indicate osseous scutes. The teeth of the creature are long and slender, utterly useless for the seizure and retention of large prey. I think it very probable indeed that its food consisted in large part, probably wholly, of the smaller invertebrates, cockroaches, land mollusks, worms, etc., and that in habit *Seymouria* was not unlike the modern land salamanders, slow and sluggish in movement, hiding under fallen and decaying vegetation in low and damp places.

The American cotylosaurs, more especially the Diadectidae, Limnoscelidae, and Seymouriidae, show marked resemblances in many ways to the contemporary amphibians, in their short legs, broad feet, enormous humeral entocondyle, digital fossa of the femur, pronounced adductor crest, as well as girdles; but I do not believe that these resemblances were so much the result of phylogeny as of convergent evolution, the adaptation to similar environmental conditions and similar habits. *Araeoscelis* alone among the known American Permian reptiles had a very slender body and delicate, slender legs, adapted for climbing, or at least for swift-moving upland habits. That there were many other reptiles in Permian times of similar structure and habits is evidenced by *Kadaliosaurus*, among others. And all these must have come from a common amphibian ancestry, so far back in Carboniferous times as to permit great structural diversity among both the reptiles and the temnospondyls in early Permian times, too great to warrant the assumption that all similar characters in the two classes are the result of heredity.

The relationships of *Seymouria* are, on the one hand, closest with *Limnoscelis*, on the other with *Labidosaurus*, but differing so markedly from both as to merit a co-ordinate independent position for the genus, which I prefer to call of family value—the Seymouriidae.